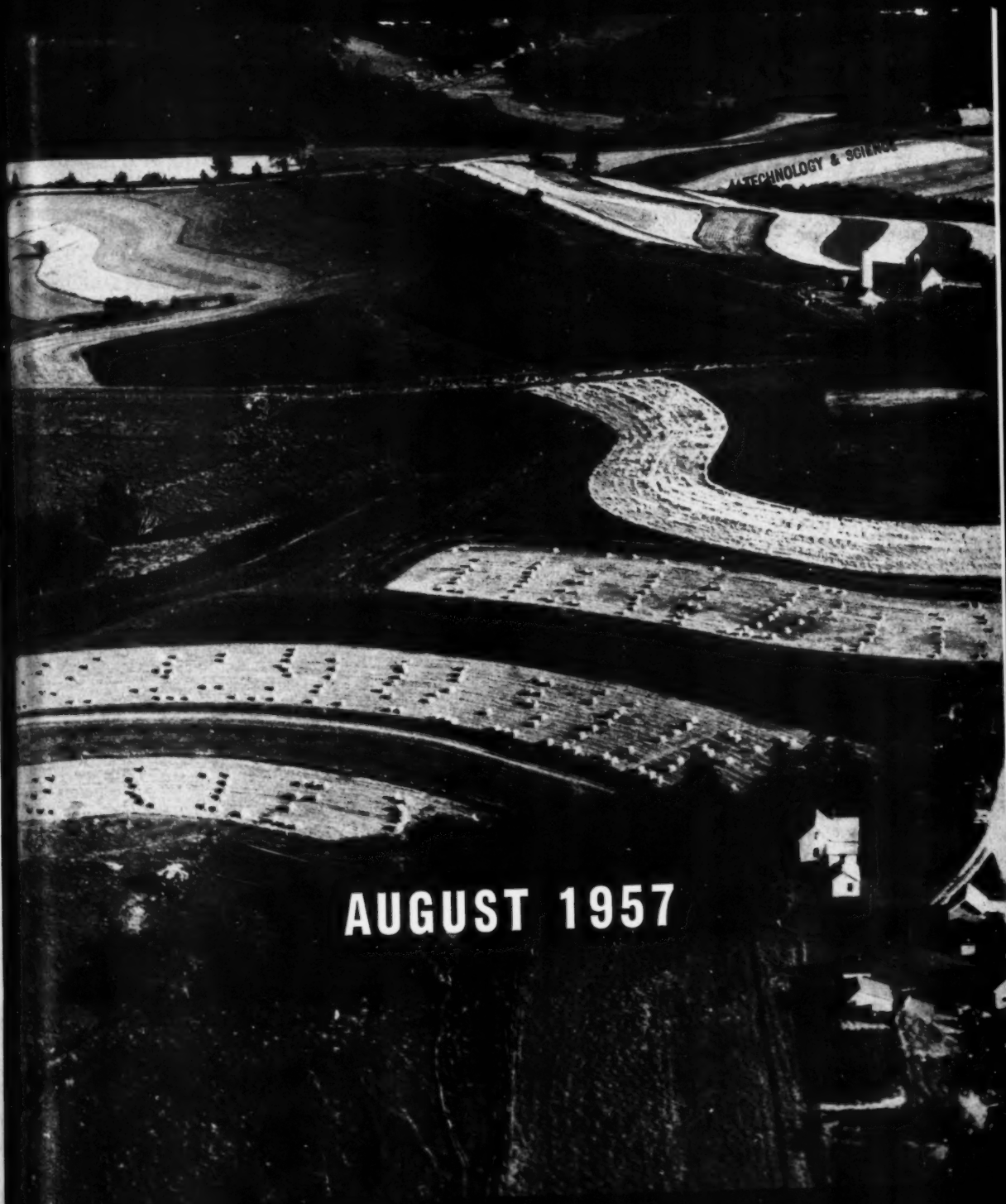

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★ THIS MONTH ★

	PAGE
ALL THE TRIMMINGS *By Lloyd M. Haisch*	3
HILLS, HOGS, AND CONSERVATION *By M. E. Fairall*	6
CHEAP FARM WATER *By Sherman F. Gold*	8
SMALL FARM PAYS OFF *By Martin Howard*	10
DRAINAGE OF IRRIGATED LANDS *By Ronald C. Reeve*	12
THE SPREAD OF PENSACOLA BAHIAGRASS *By Paul Tabor*	16
JOE B. DOUTHIT OF SOUTH CAROLINA—A Profile *By Brice M. Lathan*	17
SAGEBRUSH CONTROL *By A. E. Miller*	18
WOODLAND THINNING *By Barker W. Hopkins*	20
A BANKER'S VIEWPOINT *By Enoch T. Nix*	21
THE AMERICAN OASIS—A Review *By Tom Dale*	23
FLAT TOP RANCH—A Review *By Ben Osborn*	23

TOM DALE, Editor

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URBANIZATION IN OHIO.—Of the total area of 26 million acres in Ohio, about 15.5 million acres have been classified as cultivable land. Previous to 1942, about 2.5 million acres of cultivable land had been converted to other uses. Since 1942, nearly 1 million acres of the cultivable land have been withdrawn from agricultural use—about 675,000 acres for urban and suburban homes, commercial and industrial sites, and other private developments, and about 320,000 acres for highways, airports, parks, and other public developments.

Every new home, factory, street, highway, airport, and shopping center permanently subtracts the land so used from the remaining agricultural total. The new homes will produce children, but not the food to feed them. The new factories call for products from the land at the same time they are using up the source of production.

—T. C. Kennard

Editors are invited to reprint material originating in this magazine.

FRONT COVER.—Aerial view of farms and wooded hills in southwestern Wisconsin.

—Photo by Erwin Cole

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All The Trimmings

A South Dakota Farmer Finds It Necessary to Use 15 Different Conservation Practices Plus Community Watershed Protection Program to Solve His Problems

By LLOYD M. HAISCH

"IT takes almost all the conservation practices in the book to provide my farm with complete protection from erosion," declares Oliver "Bob" Anderson of Lincoln County, S. Dak.

Mr. Anderson started being a soil conservationist when he was a young man on Meadow Lawn Farm with his father, Herb Anderson. That was in 1939 when a CCC camp at Alcester interested the Andersons in erosion-control measures. Now, Bob has one of the most complete soil conservation programs in southeastern South Dakota. Early progress was slow, but the efforts were persistent.

In 1941, when the Lincoln Soil Conservation District was organized, Bob Anderson, along with his father, made application to the district for assistance on their 240-acre unit. It was after a heavy rain in June when Bob, looked disapprovingly at his cornfield with rows running up and downhill, made the decision. Bob said, "It just made me sick, the way the field had washed, and I told Dad we just couldn't farm it that way any more."

Technicians of the Soil Conservation Service made a soil capability map of the farm. Then the Andersons and the conservationist started making plans for this farm unit that had lost much of its natural fertility. Soon thereafter, the elder Anderson retired and Bob took over complete management of Meadow Lawn.

The conservation plan started with one important soil conserving practice and grew through the years until now it includes 15 different practices. The establishment of these measures, to reduce runoff and maintain fertility, did not come about as easily as one might think. It takes time to get a conservation plan as extensive as Bob's into operation. The driving force was the desire to provide his wife and three children with a good home and a respectable living.

Note:—The author is work unit conservationist, Soil Conservation Service, Canton, S. Dak.

After a good rotation was planned for the farm, Anderson was anxious to stop the erosion on the steeper fields. The practice of contour farming, he felt, was the first step to take and so a system of contour lines was laid out by the SCS technicians. At times, Bob says, he felt that results probably weren't worth the efforts, as he started on this "new way" of farming.

The contouring gave good results, but Bob was not satisfied. So, a contour stripcropping system was put into operation.

While the pattern of farming was being changed on the cropland, other plans were being made for the grass and woodland on the farm. The pasture, which was on flat land that flooded often, was in need of a dependable stock water supply. This was provided by a dam constructed in a waterway coming from an adjacent farm.

Besides providing this pasture with water, Mr. Anderson watched his grazing more closely and rotated with another pasture on a rented farm. This gave more pounds of beef per acre, as he "took half and left half of the grass" and the plants recovered quickly as commercial fertilizer was used to still further improve the grass.

Aerial view of the Anderson farmstead and some of the fields of Meadow Lawn Farm.

Contour stripcrops of grasses, legumes, and corn on the Anderson farm.

Stock water was needed in a pasture on an adjoining farm used to complete the rotation grazing program. A dugout was constructed with a dragline. The site had a high water table and ground water was hit at 7 feet. This gave a dependable water supply of about 5 feet, and under normal moisture conditions will provide from 9 to 10 feet of water.

Livestock is an important part of Mr. Anderson's soil conservation program. Bob says, "You can't have a good conservation program in this part of South Dakota unless you have livestock, too."

Many farmers wonder what Bob does with all the grass that he grows in his rotations. He usually has about one-third of his cropland in legumes and grasses. Grass silage provides this conservation farmer with just the outlet he needs for this crop. He has one silo for grass and another for corn silage. In the feeding of from 50 to 200 head of cattle, this makes for cheap feed and more profitable gains. Besides the grass from the cropland fields, there are several acres of waterways, headlands, and buffer areas that provide hay for silage. They also provide cover and nesting areas for upland game. These areas usually are not mowed until after the pheasant-nesting season.

Some of the waterways were so deep when he started his conservation program that they could not be crossed with farm machinery. These were graded and seeded to bromegrass and alfalfa. Now they provide "super highways" for excess water that drains from the terraces after heavy gully washers.

Yes, Bob also has terraces because he found that even contour strips would not reduce the runoff and erosion as much as he wanted. So, he constructed terraces after farming on the contour for 10 years. "That water and soil can't get very far away from my farm now," was his answer after the first terraces were completed.

The terraces used by Mr. Anderson are the narrow-base type that are not farmed. He seeds his terraces to brome and leaves them in permanent grass. Bob says he loses about three rows of corn, but doesn't have to farm the terraces and they make an ideal wildlife area. In the fall, when the stubble or stalks are grazed the grass on the terraces makes good feed for his cattle.

One might think that this surely would complete the conservation program; but, not on Meadow Lawn Farm. The windbreak that protected the buildings and yards was improved by shrub and conifer plantings. The protection from snow and wind is excellent and this, too, provides wonderful wildlife protection since the planting is 150 feet wide in places.

Anderson returns all the manure to his fields and plows under green manure, stubble, straw, and stalks. This has improved the organic matter and water-holding capacity of his soil a great deal.

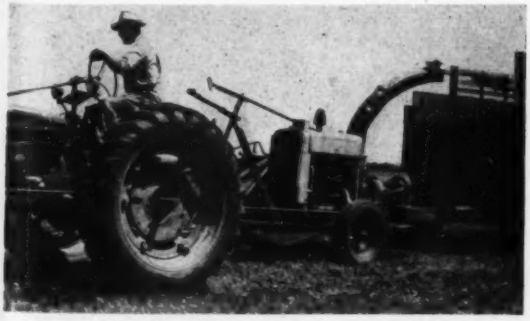
Bob Anderson is a member of the board of supervisors of the Lincoln Soil Conservation District, so he came to learn about the watershed developments that are taking place over the Nation. In fact, Brule Creek watershed, in

which his farm is located, is now being studied by SCS technicians. It was through the efforts of Bob and his neighbors that an application for assistance on a watershed protection plan for this creek was made.

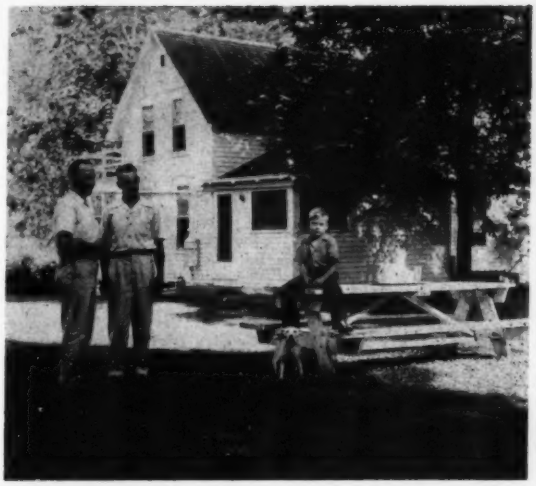
Why was a watershed program necessary when all the other practices were established? Anderson and his neighbors found they couldn't get a complete conservation program installed in their community without the cooperation of all the farmers in the area. For example, Bob Anderson's flat bottom land pasture would be the best land on his farm if he could keep the creek from spilling over its banks. It isn't safe to farm at present. However, with a watershed plan in which all the neighbors reduce runoff on their farms, and detention reservoirs constructed, many changes could be made. With this program in operation, the bottom land can be farmed and a larger part of the steeper land placed in permanent grass.

The soils map that Mr. Anderson started with suggested this change in land use. However, the flooding problem could not be solved except through group action. Some day, before Bob Anderson, Jr. takes over the farm, Bob hopes this change in land use can be made with safety.

What has all this effort cost this good farmer, and what has been his reward? The reward has been at least two-fold. In the first place, Anderson has received a great deal of satisfaction from doing everything he knows how to do, to reduce to a minimum soil and water losses on his farm. The material reward has been an increase in yields, which has meant greater profits.



Bob Anderson chopping freshly cut grass and legume crop for silage.



Les Harding, TV commentator, interviews Bob Anderson for a live TV show while Bob Jr. looks on.

In yield tests made by the county agent on corn for a 4-year period, the average yield on Anderson's farm was about 70 bushels per acre. For the same 4 years on other farms in the area, where the slope, soil type, and rainfall were almost identical, the yields were about 40 bushels per acre. This increase of about 75 percent pays good returns for the effort expended for farming the conservation way. This, to Bob, is positive proof that conservation pays. He says, "The results are beyond conception of the improvement I expected to get from this program."

These achievements have brought several recognitions to Mr. Anderson over the past 5 or 6 years. In 1953, Bob was selected as the outstanding conservationist in southeastern South Dakota. He was given an all-expense paid conservation short course at Iowa State College by the Mississippi Valley Association.

Two years before that, he received a similar award as an outstanding conservationist in the Lincoln district and was given an all-expense paid conservation short course at South Dakota State College.

In additon to practicing complete conservation on his own farm, Mr. Anderson has helped his neighbors get into a conservation program. The TV station at Sioux Falls produced a TV show on Bob's farm to help bring this story on soil conservation to the people of South Dakota.

Hills, Hogs, and Conservation

A Young Ohio Farmer Makes a Profitable Hog Farm Out of 82 Hilly Acres.

By M. E. FAIRALL

LOWELL AKEY lived on a hilly 82-acre farm near Zanesfield, Ohio. The farm just could not produce the income he needed for his family.

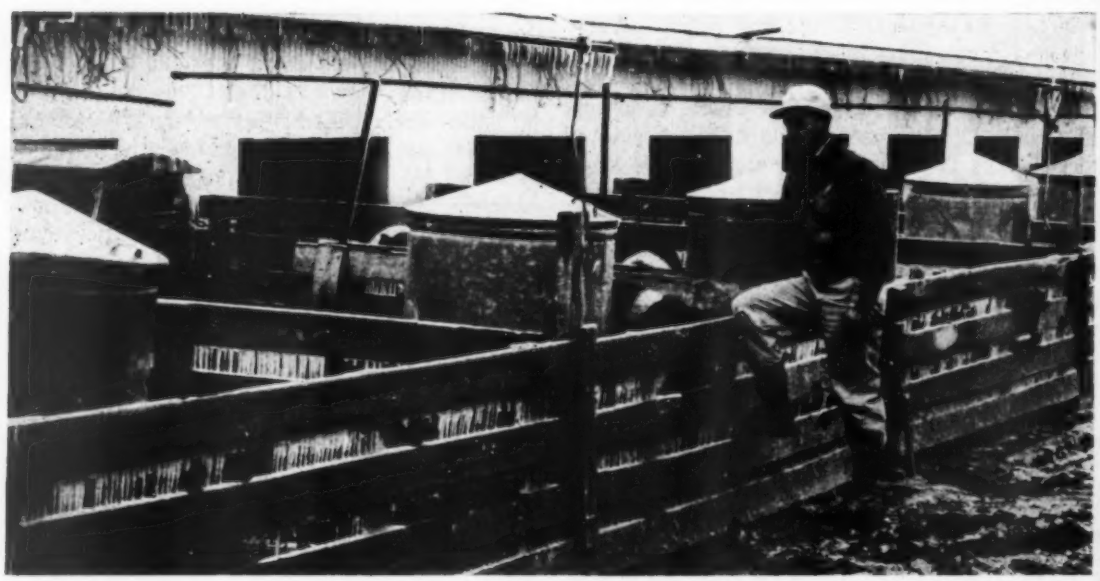
Lowell's neighbors had solved this problem by taking jobs in the factories in town. But he didn't want to be tied down to a machine. He had a rural background—his father and brothers were farmers—and he wanted to farm.

By 1947, Akey decided he had to make a choice—work in town or specialize in a farm program that would make a decent income. It could be done, he was sure, on the small farm he owned. After all, the truck farmer produced enough on a few acres to provide for his family. But, these 82 acres were not fertile enough and the erosion hazard was too great to think of crop production, so why not intensify hog production?

Note:—The author is work unit conservationist, Soil Conservation Service, Urbana, Ohio.

"I decided to specialize in hog production," Lowell recalls. "Hogs have always been one of the most profitable livestock enterprises, and are one of the most efficient of all farm animals in converting feed into meat. My past experience on the home farm was with hogs. This place would have made a dairy farm, but, I thought of the cost of remodeling the barn for a grade A dairy. Equipment comes high; so do dairy cows. I needed income quick. I couldn't buy heifers and wait for them to come into production. Besides, I was not cut out to milk cows."

Lowell weighed and evaluated all these things as he was making his decision. Once he decided to go into the hog business he had to face a hard fact: These rolling acres would never produce even a small part of the grain it would take for the number of hogs he would need to produce a decent living. So, his first decision



Farrowing sheds and feed lots on the Lowell Akey farm.

was to buy all the grain needed in feeding the hogs.

Since the prenatal period is one of the most important periods in the life of a profitable market hog, legume pasture for the sows was needed to keep them in prime condition. Hence, he built his cropping program around a top-notch rotation pasture system.

"I built the farrowing house, and the feed platforms by myself," Akey said. "Notice this farrowing pen? One-half of the floor area slopes toward the middle aisle fence. A sow always lays down to farrow with her back up the hill. The new pigs can crawl downhill under this guard rail. Hot water pipes are buried under the floor. There is a lot of difference between warm and cold concrete in saving newborn pigs."

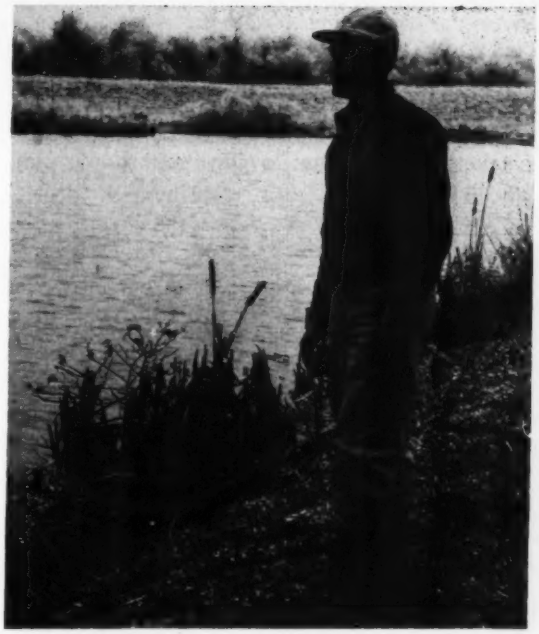
"There still was a problem I hadn't solved," Akey continued. "The well on the farm didn't produce enough water for the house. A new well didn't hold much promise in our terrain. Early in my planning, I outlined my problems to Walter H. Dove of the Soil Conservation Service. After looking the situation over he suggested a farm pond about 500 feet from the buildings. There was a good site there and it would be handy."

Lowell became a cooperator with the Logan County Soil Conservation District. SCS engineers designed a 3-acre pond. A local contractor with a bulldozer built an earthen dam of 1,500 cubic yards. Behind this dam there is clear water, 11 feet at the deepest. Around 10 million gallons of water can be drawn through the filter. Water is removed and electrically pumped to the automatic waterers in the farrowing house and the concrete feed lots.

The pond also supplies all the home water needs except for drinking and cooking. Mrs. Akey says she never could have had an automatic washer and bathroom without the farm pond.

"The kids and I certainly do enjoy having fishing and swimming right here at home. The thought of hooking one of those 2 pound bass, or a big blue, is incentive to hurry along with those evening chores."

The SCS farm planning technician divided the fields for a rotation of small grain and 2 years of hay or pasture. This provides plenty



Lowell Akey beside the 3-acre pond that furnishes water for his hog farm.

of clean legume pasture for the sows. During the winter, alfalfa meal is used to supplement the grain ration.

With a start of 30 brood sows in 1951 the enterprise has been built to 75 sows for 1957. Akey marketed 800 hogs in 1956, and plans to market 1,100 in 1957. All of the grain feed is purchased. He spends all his time caring for the hogs.

"The test of the enterprise is how much feed it takes to produce a pound of pork", Akey explained. "Last year's records showed it cost me 340 pounds of grain to make 100 pounds of pork, and that included the sows' feed.

"A fellow has to watch the markets too. I can't sell every hog I produce at the top figure. At the present time, my plan is to have the sows farrow in November, December, and January, then again in June, July, and August. This way I can keep away from the low markets and get some of the top prices."

Akey concluded: "I have the best success with sows fed on high quality legumes to keep them in prime condition. The number of pigs farrowed and their strength and vigor at

farrowing are reflected by the care and condition of the sow during gestation. The rotation pastures take care of that. To compete in pork production it is necessary to have the largest number of pigs per litter possible reach marketable age. That is why I am doing only one job and doing it to the best of my ability."

CHEAP FARM WATER

Many Farmers in Southwestern Virginia Are Developing Seeps and Springs for a Cheap, Dependable Water Supply.

By SHERMAN F. GOLD

IF you want to make what seems like a little water go a long way, develop a seep or spring. You can easily overlook seeps because they just ooze water. You'd never think one would produce enough water to be worthwhile. Yet, a trickle of only 3 pints a minute will keep a 500-gallon tank full. It will supply enough water for 30 cows daily. It's cheap too—usually cheaper than a pond—as many farmers in Virginia and nearby States are finding out.

Ralph G. Gunter can tell you about seep and spring development. As part of his soil conservation program, he built a pond on his 155-acre dairy farm near Abingdon, Va. It cost $1,300. The Agricultural Conservation Program (ACP) paid about 40 percent of the cost. But, the pond didn't fully solve the water problem for his 60 cows and 20 heifers. It was at one end of the farm. Often the cattle were at the other end. They walked off a lot of milk hoofing it back and forth for water.

Then, Gunter developed 2 seeps on his place. He built two 500-gallon concrete troughs or tanks. He put the troughs in fence rows. That way each serves 2 pastures. The seep development cost about $100 for each trough. ACP paid half.

Note:—The author is work unit conservationist, Soil Conservation Service, Abingdon, Va.

"The ACP people told me that dollar for dollar their seep or spring development investment brings the greatest returns," Gunter said. "It's a permanent investment, for one thing. It pays dividends year after year. I figure that on a dairy farm like mine, the increase in milk production will pay for the seep development in a year. With plenty of clean, fresh water handy, the cows really turn out the milk.

"I wouldn't part with my pond," Gunter says. "It has other uses. It's close to my home, dairy barn and other buildings. It's nice to know that it contains over 2 million gallons of water in case of fire. It gives the farm a pretty touch. It makes an attractive setting, especially when ducks are swimming on it. And we've stocked it for fishing. But for a cheap, dependable supply of water, nothing can beat a seep or spring development. Be sure, though, that the seep or spring flows the year around—doesn't dry up in droughts."

Even if they were as cheap, ponds won't always do in southwestern Virginia and surrounding areas. The soils are of shale, sandstone, and limestone origin. Often they don't hold water. Sometimes the ponds are slow in filling up, and may not stay full. In dry and windy weather the water evaporates fast.

Stock water tank supplied by a seep on the Ralph G. Gunter farm furnishes fresh water to two pastures.

A developed seep on the Lewis Bebber farm flows into the sealed tank in foreground. From there water is piped to the Bebber house and to the three stock water tanks in background, two of which are on adjacent farms.

This modern seep and spring development business started in southwestern Virginia only 2 years ago. Supervisor I. H. Huff of the Holston River Soil Conservation District wanted a stock water pond on his farm. But, technicians told him the site wasn't good for a pond. A rocky soil condition made it doubtful that the pond would hold water. And the capacity of the pond, because of a steep slope, would be too small to make the investment sound. The technicians advised developing a small spring they found on his place.

Huff discussed his problem with the other district supervisors. They voted to buy steel forms to make 500-gallon troughs. The district rents the forms to farmers for $7 per trough. Through the district one can also get ready-made concrete sediment boxes for $7.50 each. A farmer can develop the seep or spring himself or get the neighbors to help.

Gunter figures it takes three man-days per job. If you don't want to mix the concrete, you can get ready-mix. In some places, you can even buy ready-made concrete troughs.

SCS technicians have a standard formula for the job: Clean out the area around the seep or spring, and backfill it with a mixture of sand and gravel. Build a short concrete wall about 16 inches deep to keep the water from escaping below the gravel bed. Lay drain tile in the gravel bed to accumulate, filter, and lead the water to a sediment box. Any remaining sediment settles in the box. Run an underground pipe from the sediment box to the trough. The water entering the trough is clean and clear. Flow is by gravity.

A pipe takes overflow water away from the trough to a suitable outlet or to another trough down the slope. Water doesn't spill over. So, the livestock can't make a mudhole around the trough.

A lot of farmers get double use out of one little seep or spring that used to make only a messy wet spot. They make the one seep or spring supply two troughs. They get other benefits too; they can use the former waterlogged areas. Sometimes that means as much as an extra half acre. Besides, there's no longer danger that livestock will trample the seep or spring. Trampling a spring or seep can make it change its course, reduce its flow, or dry it up altogether.

One small seep, near Lodi, Va., is watering cattle on three farms. In addition, it supplies the home needs of one of the farmers, Lewis Bebber. He used to haul household water from a store half a mile away!

Bebber fixed up the seep and piped the water into a sealed reservoir. From there he pumps water to his home. Overflow from the reservoir goes by gravity to a trough in one of his

Sediment box and stock water tank of a newly developed seep in a mountain pasture of the T. L. Hutton ranch.

pastures. The overflow from this trough goes to one on Mrs. Julia Mock's farm down the slope. And, from there the overflow is piped to a trough on John Sheffield's farm still lower down on the slope.

Judge T. L. Hutton's beef cattle put on more weight when they grazed high up in the mountains near Saltville, Va. But they lost the extra pounds and more, walking long ways for water. So, Judge Hutton developed a spring

Sealed tank on the J. F. Copenhaver farm supplies pure water to the grade A milking parlor. SCS technician, in background, checks sediment box.

at an elevation of 3,500 feet. Now, with water close by, the cattle will be able to hold their extra gains.

J. F. Copenhaver of Glade Springs developed a spring as part of his dairy operations. He pipes the water from a sealed concrete trough. The water reaches his grade A milking parlor clear and pure. County health officers said the new way was better than the old of getting the water from an exposed spring.

In 2 years, more than 50 farmers in Washington County alone have developed springs and seeps. The idea has spread to other Virginia districts and has jumped across the State line into Tennessee, where steel forms for concrete tanks are now being supplied to cooperators by soil conservation districts.

Small Farm Pays Off

By MARTIN HOWARD

TAKING the leap from tenant farmer to landowner can seem like a mighty long jump when you consider the big mortgage that will be staring you in the face for many years. That's the way Robert Cox, of Forsyth County, N. C., felt about it when he borrowed money through the Farmers Home Administration to buy a 63-acre farm in 1945. He admits he had many misgivings.

But, today Cox has done considerably better than make the grade. In fact, he is frequently cited in his local community as an outstanding example of a successful small farmer.

During the past 12 years, Cox has made a good living from the farm. He has put 2 children through high school, has modernized his small farm home, made needed repairs to outbuildings, and has completely mechanized his farming operations.

In the meantime, he has whittled down the mortgage to where it is all but paid off.

When Cox, his wife, and the 2 small children moved to the farm 12 years ago, some of the land was badly eroded. One of the first things he did was to work out a conservation plan for the farm with the Tri-Creek Soil Conservation District.

With the help of Tony Ernstes, Soil Conservation Service technician assigned to the district, he terraced and stripcropped all his cultivated land. He set up systematic rotations, limed and fertilized, seeded soil-building crops, and established sod waterways.

He also established improved pastures; and, more recently, has built a farm pond that he plans to use for irrigation. Payments from the Agricultural Conservation Program have helped in setting up approved practices.

But, the big payoff has been in improved production as a result of his conservation program: Wheat yields have increased in bushels per acre from 10 to 44; oats from 20 to 100; and corn from 15 to 85. Tobacco, his chief

Note:—The author is farm editor of the *Journal-Sentinel*, Winston-Salem, N. C.

Tobacco in contour strips on the Robert Cox farm.

crop, has jumped from 900 pounds per acre in 1945 to 2,400 pounds last year.

The increased moisture-holding capacity of his soil was indicated 3 years ago, when drought ruined many tobacco crops in the area. Cox reports that his average tobacco yield that year was 1,700 pounds per acre.

Plenty of fresh vegetables and canned goods for winter use is one of the family's strong points. They have several garden tracts enabling them to rotate the crops from year to year.

"A good garden saves buying many things," Cox says. "This is especially important for a small farmer, because he has to be a little more saving than a larger operator."

When tobacco allotments began to shrink several years ago, Cox added a flock of 100 laying hens to his farming operations. To offset another 20 percent cut in tobacco acreage this year, he plans to put in an extra batch of 100 chicks, "so our egg production will run the year around, not for just 6 months," he says.

Cox raises and fattens about 20 head of hogs each year. He also has 2 milk cows and soon will add a third. He hopes to add some income from the sale of milk. Ten acres of improved pasture on land seeded down early in his conservation program will help him carry out this plan.

Cox doesn't give all the credit for his success to soil and water conservation alone. Better seed varieties and better cultural methods have helped a lot, he says.

"I figure," he comments, "that these new methods are developed for farmers by our research men at the colleges and experiment stations, so why not make use of them after they're tested and passed on to us."

Modern machinery has helped Cox to keep up with the farm work, now that his son, William, is married and works on the farm only a part of the year.

His daughter, Viola, who finishes high school this year has twice won the district tobacco growing championship and was top-place winner for the western half of the State last year. She also has taken several top awards with her entries at livestock shows.

One gets the impression from this family's success, that a family-size farm can still be very much in the running, if the farmer keeps abreast of progress in soil and water conservation and improved farming methods.

Drainage of Irrigated Lands

A Report on the Drainage Problems in Irrigated Areas and the Improvements That Have Come About Both From Experience and Research.

By RONALD C. REEVE

No. 26

This is the twenty-sixth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

THE importance of drainage of farmlands has been recognized for thousands of years. Both open and closed drains were used by some ancient civilizations, at least, as early as 500 B. C. In this country, farmers have drained lands for agricultural use since the early days of settlement. But, most drainage operations were confined to wet lands in humid areas until recent years. Now, we are finding that drainage is fully as important on much of our irrigated land in western States as on the wet lands of the East.

Many of the drainage practices useful in humid areas have been successfully employed in draining irrigated lands. Because drainage in this country first began in the humid region, it is natural that methods and techniques developed under such conditions should serve as a guide for developing methods for draining irrigated lands. The fundamental principals of drainage apply in both humid and irrigated areas; but, there are many differences. These differences have required the development of new concepts and new drainage practices.

Perhaps the most important single thing that makes the drainage of irrigated lands unique is the salinity factor. Salts contained in soil, in ground water, and in irrigation water greatly change the requirements for adequate drainage. Salts are suspended in and move with water, accumulating at the soil surface when water is evaporated. Drains must not only be designed to discharge excess water, but also to discharge excess salts, thus preventing a buildup of salts in the crop-root zone.

Drainage of irrigated lands also differs from humid-area drainage because of man's control over the water that is supplied to crops. In humid regions, the farmer usually depends almost entirely on rainfall. Drainage systems must be designed to discharge untimely, and infrequent high-intensity rains, to control ground water tables under any and all conditions that might occur.

In irrigated areas there is control over the amount and frequency of water applications. Because of this, a farmer, either directly or indirectly, has control of most of the water that has to be drained. In fact, much of the difficulty in maintaining proper drainage conditions in irrigated soils is brought about by man himself. For example, seepage from canals, which can be prevented, adds to drainage problems. Inefficient irrigation practices, such as poor water distribution and excessive water application, also create problems.

Another difference that sets apart the drainage of irrigated soils from those in humid areas is the changing of surface topography in preparing lands for irrigation. Land leveling, or grading, is a common practice in preparing land for irrigation. It improves surface drainage by providing for better distribution of water, and tends to eliminate "low spots" or "seepage ways" where water collects and stands. Thus, land preparation generally improves drainage conditions and directly affects the extent and nature of the drainage systems required.

From the rather simple, perhaps crude, methods used by settlers in Colonial days, the "art" of drainage has gradually progressed toward becoming a "science." The early drainage work in this country consisted mostly of

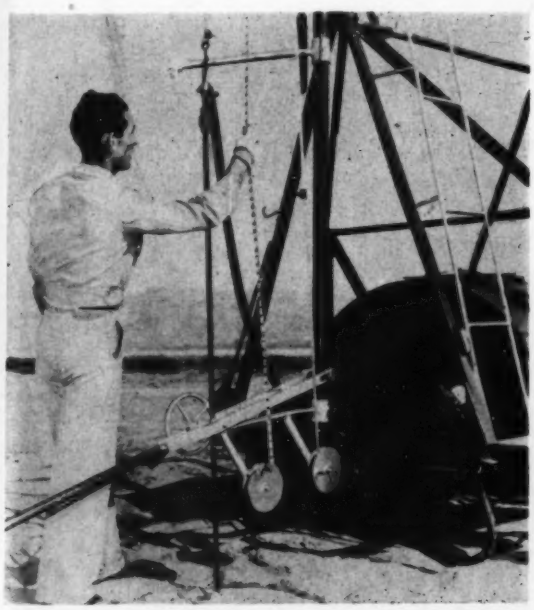
Note:—The author is irrigation and drainage engineer, salinity laboratory, soil and water conservation research division, Agricultural Research Service, Riverside, Calif.

either constructing small open ditches to drain wet spots in fields, or of cleaning out small natural waterways. Little engineering work was involved.

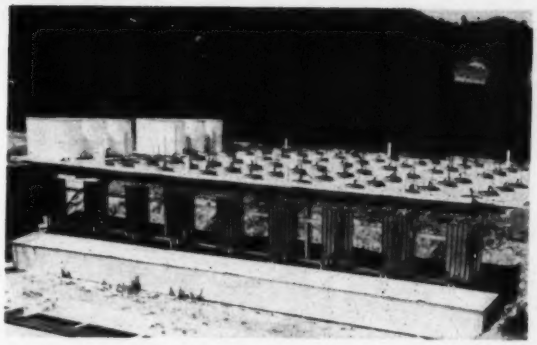
The art of molding clay tiles and of installing them by hand on farms was brought over from Scotland in 1835. This was the beginning of modern tile drainage in the United States.

Through the years advances were made in the equipment, materials, and methods used, and in engineering principles governing both open and closed drains. Part of the advancement came about as experience was gained by farmers, contractors, and technicians, as more and more drainage systems were constructed. Then, too, organized drainage research has accounted for a substantial part of this advancement, especially in providing a better understanding of the principles involved.

Through research, improved techniques and equipment have been developed for studying drainage conditions. For example, a special type of groundwater observation well and a groundwater piezometer have been developed to determine water table levels and direction of ground water flow.



Jetting rig for installing piezometers. During installation, the depth of the lower end of the pipe may be read on the measuring tape.



Lysimeter installation for studying the effect of salts and water tables on crops, at the Salinity Laboratory, Riverside, Calif.

A jetting method of installing piezometers allows for logging of subsoil materials as the pipe is jetted. This makes it possible to install piezometers to much greater depths than by conventional driving methods. Small diameter pipe (⅜ inch) is used for this purpose. Piezometers of this diameter have been successfully installed and the soil logged to depths of 150 feet. This method and the equipment were developed in Coachella Valley, Calif., on a project conducted jointly by the University of California, the Bureau of Reclamation, the Coachella Valley County Water District, and the U. S. Salinity Laboratory. During the study, about 900 piezometers were installed to observe changes in the level of the ground water table since 1947.

Drainage research at the U. S. Salinity Laboratory has shown that, within limits, a high water table by itself is not necessarily detrimental to crops. In studies where the effects of both water tables and soil salinity on crop growth were investigated, the salinity of the soil was found to be by far the most important factor. In practice, if salt is not a factor, a shallow water table provides an effective way of supplying the required moisture for crop growth, as is the case in many humid regions.

In irrigated soils, however, the salinity factor must be taken into account. The detrimental effect of a shallow water table in irrigated areas, in most cases, comes primarily from the high salt content of the ground water and the rapid rate at which the soil becomes salinized

Installing tile drains in the Imperial Valley, Calif. Note sand piles that will be used for filter around tile.

when the water table rises near to the surface. In some cases, productive land has become completely unproductive in 3 months after the water table has come to within 24 or 30 inches of the ground surface. In general, where salt is a problem, the water table should be kept at least 4 to 4½ feet below the ground surface, and preferably to greater depths.

Field investigations are being conducted in at least 7 of the 17 Western States to develop better criteria for the design of drainage systems. These studies are conducted cooperatively by the Western Soil and Water Management Section, Agricultural Research Service, and the Agricultural Experiment Stations in the respective States. In many cases, the Soil Conservation Service and others are also participating. At Fort Collins, Colo., laboratory studies have been conducted in which a sand-filled tilting flume 2 feet wide by 72 feet long has been used to help answer some of the questions regarding the shape of the water table and the quantity of water discharged by interceptor drains.

Methods and equipment have been developed for installing tile drains in alluvial valley-fill soils that are common in many of the irrigated valleys of the West. Much of the pioneer work along this line has been done in the Imperial Valley, Calif. These developments have come through the efforts of private contractors working with both Federal and State agencies.

Open drains, which range from about 7 to 12 feet deep at approximately a ½-mile spacing, serve as outlet drains. Tile drains are used to drain individual farms. Individual fields are "bored out" by technicians of the Imperial Irrigation District and the Soil Conservation Service to locate the sand and clay layers in the profile.

On the basis of both research and experience in the area, a knowledge of the soil texture in the profile has been found sufficient to make determinations as to depth and spacing of drains.

Both clay and concrete tile are used in the Imperial Valley. Clay tiles are made in 1-foot sections with butt joints, whereas concrete tiles are 2 feet in length with tongue and groove joints. Clay tiles are mechanically pressed out while concrete tiles are generally made by the packer-head method to insure a high density concrete.

Tile laying equipment has been perfected to the point where the machine installs the tile at the appropriate depth and surrounds it with a sand filter of from 2 to 3 inches on all sides. The trench is usually backfilled with a bulldozer. As the tiling machine passes, the trench is supported by a steel shoe which follows behind the cutting wheel. The individual tiles are placed by a man who rides inside the shoe. Tiles are pushed into place with a hydraulic jack to insure positive contact and permanent alignment. The usual depth of tile drains is 7 to 7½ feet below ground surface. Feeder lines are 4 to 6 inches in diameter and collector lines 6 to 10 inches in diameter.

Tile drain outlet consisting of a 20-foot length of transite pipe, Coachella Valley, Calif.

Newly constructed open drain in the Coachella Valley, Calif. After the banks have drained and sloughed the ditch will be shaped to grade by a second pass of the dragline.

Many things have been learned as a result of experience in constructing open ditches and installing tile drains under the varied conditions encountered in the irrigated region of the West. For example, in areas where soils are unstable, due to inflowing water from a high water table, much caving and sloughing of banks may occur. Under these conditions, it is often impossible to dig a ditch to grade with the first cut. But, by allowing the banks and soil to drain after the first cut, a ditch can usually be dug to grade with a second pass of the dragline, though sometimes it may be necessary to redig a drain 4 or 5 times before final grade is reached.

Another simple, yet highly important, practice in tile drain installation is the use of a solid pipe for a distance of 15 or 20 feet from the outlet to connect with the regular tile which is in short sections. This prevents the undercutting and dropping of tile sections at the outlet end that otherwise might occur.

The importance of a sand filter around tile laid in alluvial soils has also been established. The elimination of maintenance difficulties due to filling of tile with silt and sediment more than compensates for the extra cost of providing a sand filter. In addition to its primary purpose of filtering out sand and sediment, there are also other advantages to a sand filter. It serves as a supporting base for laying the tile. Also, there is no need for leaving spaces between tile joints when a filter is used, because it has been found that tile sections can be pushed together tightly where a highly permeable material surrounds the tile. The irregularities between the matching tile ends allow enough open space for the water to enter.

Through years of experience, these and other developments, such as preventative measures for keeping tile drains free from roots and the exclusion of risers (observation boxes, air vents, etc.) from tile drains, have come about. Improved techniques in determining the best locations and the depth and spacing of tile drains have been developed through research coupled with years of testing.

Undoubtedly, drainage practices will continue to be improved as new materials and equipment become available and as our understanding of the principles involved expands.

The process by which drainage progresses from an "art" to a "science" may be accelerated by increased research effort. By coordination of effort on the part of contractors, farmers, researchers, and others concerned in advancing the knowledge in this important field, improvements, in the next 20 or 25 years, will add materially to the well-being of both farm and city dweller alike.

LIVING GRASS EXHIBIT ON OFFICE "LAWN".—The "lawn" in front of the Indian-American Valleys Soil Conservation District office at Quincy, Calif., serves as a demonstration plot for improvement of ranges, pastures, and meadows. One side of the "lawn" is planted to 24 different grasses and legumes adapted to the area; each is planted in an individual row 6 feet long. The other side demonstrates two recommended methods of seeding grass and legume mixtures. It also shows the effects of fertilization, since half the plot is fertilized while the other is not.

The demonstration has created a great deal of interest, not only among ranchers and farmers but also among businessmen and other citizens of Quincy. Furthermore, SCS technicians report that the living exhibit has done much to help get better pastures and ranges in the community.

—ROCHE D. BUSH

THE NATIONAL INTEREST demands that the application of soil and water conservation be speeded up on the farms and ranches and on the watershed, grazing, and forest lands throughout the United States . . .

—EZRA TAFT BENSON
Secretary of Agriculture

The Spread of Pensacola Bahiagrass

By PAUL TABOR

MORE than 10 million pounds of Pensacola bahiagrass seed, produced during the past 17 years, can be traced back to 2 burlap bags of sprigs. The author dug the sprigs during the early part of May 1940, at Pensacola, Fla. They were washed free of dirt to avoid contamination with white-fringed beetles. After an official inspection and clearance, the sprigs were taken to the SCS nursery at Americus, Ga. and planted. This was the first known planting of this grass for seed production.

Before 1940, the county agent at Pensacola, E. H. Finlayson, had discovered this grass and had harvested some seed from naturalized stands. Local farmers had sowed some of it in pastures. Sometime later Mr. Finlayson began seed production on his farm, near the Georgia-Florida State line. It was he who proposed the name, Pensacola bahiagrass.

Fifty pounds of seed were harvested at Americus during the summer of 1940. A larger area was sowed at the nursery in 1941. Enough seed was produced for limited field distribution in 1942, while the acreage was expanded on the SCS nursery. During 1943 and the following 5 years, enough seed was produced and distributed from Americus to establish at least one 5-acre planting in each soil conservation district in the lower half of the Southeast. Seed was saved from many of these plantings and used to start additonal fields for seed production.

Normally, a new grass seed goes into a rod row at a nursery for initial study. If it is superior there, a larger planting on a more difficult site is made and studied. If the grass continues to be superior, it is ready for field-size plantings on farms of interested soil conservation district cooperators.

Pensacola bahiagrass was introduced and increased more rapidly than is normal. Naturalized stands at Pensacola were dense and productive on light, sandy soils. The plants were robust and started growth early in the spring. In the first plantings made on farms, Pensacola bahiagrass continued to perform well. These successes confirmed an early estimate that the new grass was valuable for soil and water conservation in the Coastal Plains of the Southeast.

The rapid expansion and distribution of Pensacola bahiagrass seed production would not have been possible except that the grass filled a real need. It grows a dense sod, is easily maintained, and is resistant to abuse. On land of average low fertility, it has been one of the most productive grasses. On the richest lands, however, other grasses surpass it in yield and quality.

The earliest history of the grass is not known. It was brought to Pensacola, probably in ship ballast, from southern Brazil, Uruguay, or Argentina. The sailing vessels, formerly in the lumber trade between the United States and South American countries, usually carried rock and dirt ballast when cargoes were light. Hence, the grass seed may have arrived in ballast and the grass became established near the city docks.

Pensacola bahiagrass seed crop almost ready for harvest.

Pensacola bahiagrass seed is eligible for certification in Georgia and may soon be eligible in other States of the Southeast. Part of the early established sod at the Americus nursery, now a plant materials center for the Southeast, is being used to produce registered seed.

Note:—The author is plant material specialist, Soil Conservation Service, Athens, Ga.

DISTRICT PROFILE

JOE B. DOUTHIT of SOUTH CAROLINA

THE name of Joe B. Douthit and Soil Conservation Districts are all but synonomous in South Carolina and in many other parts of the United States. Mr. Douthit has the distinction of being the oldest Soil Conservation District supervisor, in years of service, in the United States.

He says it all began on his farm near Pendleton, S. C., when he realized that his soil was being washed away faster than it was being rebuilt, and that the water that flowed off his land was needed by the crops on the land. He was instrumental in helping form the first Soil Conservation District in South Carolina, which was the second in the Nation.

He, with the late K. W. Marett, was appointed a district supervisor in August 1937. He has served continuously in that capacity, to date. He has served as chairman of the Upper Savannah Soil Conservation District for 15 years, as president of the State Association of Soil Conservation District supervisors in South Carolina for 5 years, and has just completed a 4-year term as chairman of the State Soil Conservation Committee. He was active in helping the late E. C. McArthur establish the State and later the national Associations of Soil Conservation Districts, and is currently a director of the National Association.

To visit the Douthit farm, is an inspiration to any person interested in the soil and products that come from it. He is a farmer who uses land and water but conserves both of these vital resources.

There are four ponds on the Douthit farm—some used for stock water, some for irrigation, and all used for fish production. On this farm one also finds terracing, crop rotations, strip rotations, orchards, vineyards, truck crops, and livestock. Here you will find the background of a farmer devoted to soil and water conservation and the "district" approach to these problems.

In addition to his work in the field of soil and water conservation, Joe Douthit has been recognized as a Master Farmer and has been awarded a Doctor's Degree in Agriculture by Clemson College, where he served as a Trustee for 20 years.

He was largely responsible for planning the Rural Ministers Conference which is held annually at Clemson in connection with Farmer's Week. This has helped acquaint ministers with rural problems. Also, he has served on the Town and Country Commission of the Methodist Church and was among the first to grasp the significance of teaching soil and water conservation in our schools.

Even before the extreme droughts of 1954 and 1955, Dr. Douthit was actively working toward a proposed water law for South Carolina. It was under his leadership that a study was begun in 1950 to draw up a proposed law. As a result of these studies and work, other southeastern States have since used this as a model in developing water laws for their states.

Joe B. Douthit.

Dr. Douthit has received many honors for his work in the field of soil and water conservation. He has been appointed an Honorary Member of the Soil Conservation Society of America and has been awarded a certificate for conservation farming by the Woodmen of the World.

In 1951, he was awarded a Balanced Farming Plaque by the Extension Service. That same year at the State Convention of the Future Farmers of America he was awarded an honorary degree as State Farmer. These honors have not just come—they have been earned by unselfish devotion to the cause of soil and water conservation, proper land use, and an interest in his fellowman.

—BRICE M. LATHAN

SAGEBRUSH CONTROL

Spraying Sagebrush on a Washington Range Results in a Three-fold Increase of Grass Forage.

By A. E. MILLER

SPRAYING sagebrush on the John Clerf range in the Kittitas Soil Conservation District, Ellensburg, Wash., has killed 95 percent of the sagebrush and increased grass production from 185 pounds to 780 pounds per acre. The treatment cost $4.00 per acre.

In 1954, with the help of Harry Wegeleben, range conservationist of the Soil Conservation Service, Mr. Clerf sprayed 20 small plots with 2,4-D and 2,4,5-T at different rates, to find which chemical would produce the best result and to determine the most economical rate of application. As a result of this trial, the Clerfs sprayed 500 acres of sagebrush-bunchgrass range in May 1955.

They used 1.6 pounds of the amine form of 2,4-D in 5 gallons of water per acre. Two ounces of a commercial wetting agent were added to each 100 gallons of solution. The spray was applied from an airplane.

In May 1956, Wegeleben reported that 95 percent of the sagebrush had been killed.

In August 1956, a check was made of two fenced and ungrazed plots; one sprayed, the other unsprayed. All the current year's growth was clipped on 9.6 square feet of each plot. The clippings were weighed and the total air-dry weight per acre calculated. The sprayed plot produced 780 pounds of grass forage per acre with no sagebrush growth. The unsprayed plot yielded only 185 pounds of grass, with 475 pounds of sagebrush per acre. Difference in the total weight of herbage produced per acre on the 2 plots was only about 100 pounds. But, in the sprayed plot all the available moisture and fertility were used to produce grass. In the unsprayed plot 72 percent was used to produce sagebrush and only 28 percent to produce grass.

To put it another way: If 50 percent of the total grass production was left each year to maintain grass vitality and protect the soil from erosion, then comparative stocking rates should be 1 A.U.M. (animal unit month) of grazing for each 2 acres on the sprayed plot, and 1 A. U. M. grazing for 8.7 acres on the unsprayed plot. For the 500 acres sprayed this would mean there had been an increase in grazing capacity from 58 to 250 A. U. M.'s.

Results were not as uniform over the entire 500 acres as on these test plots. Yet, Mr. Clerf estimated that he had 3 times as much grass 15 months after spraying as he had before spraying.

Increase in vigor of the grass was also quite apparent in the sprayed area as compared with the unsprayed range. Native bunchgrass and occasional crested wheatgrass plants (from an earlier but unsuccessful attempt at aerial reseeding) were not only larger where the sagebrush was sprayed, but one-third of the plants were still green in late August. Even cheatgrass growth was heavier.

The sprayed range is only a small part of one of Clerf's pastures. On April 6, 1956, he turned 650 yearling and 2-year old heifers into this pasture. One hundred head were taken out on June 20. Another 200 went out July 1, and the remainder on August 1. John Clerf said, "The cattle all came off in good condition. Even those we took off the first of August were in as good shape as those we had on irrigated pastures. Another thing! I noticed that the cattle all seemed to like the feed from the sprayed area better. Every time I came out here they

Note:—The author is work unit conservationist, Soil Conservation Service, Renton, Wash.

Sprayed area where bunchgrass is rapidly taking over the space formerly occupied by sagebrush.

were grazing in the sprayed area. This deal looks so good that we intend to spray all of our range that needs it. In fact, it would pay to spray it every 5 years if we can get these same results."

Similar results have been obtained in other trials in the Northwest. The elimination of sagebrush on another range similar to the Clerf range upped grass production as much as 3 times and increased gains on yearlings from 5.6 to 17.6 pounds per acre.

The use of chemical spray to remove sagebrush has two advantages over railing: It costs less, and it leaves the dead brush on the range to protect the soil against erosion until the grass cover is reestablished.

The spraying should be done in May in this area. This is the period when sagebrush is making its fastest growth and best results can be expected.

Wegeleben says, "Spraying operations should be done only when the wind is less than 10 miles per hour. The plane should just clear the top of the brush. The increase in forage production should be permanent, as long as careful grazing control is practiced and sufficient remnants of the perennial native bunchgrasses remain to use efficiently the extra moisture and fertility made available by killing the sagebrush."

As a result of Clerf's success, more than 2,700 acres of the same type of rangeland belonging to four different owners were sprayed in the Kittitas Soil Conservation District in 1956.

FERTILIZER VERSUS SOIL MANAGEMENT.—Commercial fertilizer is not an adequate substitute for good soil management in soybean fields, according to A. R. Albert, soils specialist of the University of Wisconsin.

In experiments, Albert found that land that was limed, fertilized, and planted to forage legumes for two or more years, prior to planting soybeans, consistently gave better crops than cornland that had been poorly managed for several years, then fertilized and planted to soybeans.

He found, however, that soybeans do respond to moderate rates of fertilization, especially potash and phosphorous, if the soil has been well managed in preceding years. He recommends 0-10-30 fertilizer for soybeans on well-managed soils and questions the economic value of nitrogen fertilizer. Rate of application should be no more than 250 pounds of 0-10-30 fertilizer per acre and should be applied as a side dressing at the first cultivation, according to Albert.

LUMBER CONSUMPTION.—Americans used 39.3 billion board feet of lumber in 1956—enough to build a 30-foot boardwalk from the earth to the moon. Softwood consumption accounted for more than 80 percent of the total. The 1956 consumption was about 7 percent below that of 1955 but 2.5 percent above the 10-year average.

Woodland Thinning

The Directors of a New York Soil Conservation District Provide Chemical Tree Thinning Service to District Cooperators.

By BARKER W. HOPKINS

AFTER 2 years of successful operation, the Clinton County Soil Conservation District directors believe they have a cheap and effective way of thinning woodlands. They've been doing it for $25 an acre. Other methods, previously tried, cost $50 to $100 per acre.

The directors think that the new scheme will step up the thinning of the district's woodlands. More than one-third of this New York county is woodlands. Because of high thinning costs in the past, valuable white pine stands had become stagnant—trees were so thick they couldn't grow to profitable size. They needed light and air. They were on starvation rations—too many trees for the plant food in the soil.

Mechanical thinning had been a costly process, so the directors turned to chemical thinning. They hired 2 men at $10 a day, supplied them with sodium arsenite, hatchets, machetes, squirt-type oilcans, and goggles and rubber gauntlet gloves to protect them from the poison. Thus equipped, the 2 men can thin from 1 to 2 acres a day.

The district offers the thinning service to cooperators at $25 an acre.

The directors are sure the farmers of Clinton County are on their way toward making more money from their woodlands. The first year farmers thinned 36 acres. In 1956, they thinned 60 acres.

The work is done during what's known as the "peeling" season: May through August. That's also the best time for using tree-killing chemicals.

Here's how the two men work: In the morning both cut the trees with a hatchet; in the afternoon one continues the hatchet work while the other squirts the killing chemical into the cuts. So far the treatment has been almost 100 percent successful.

Note:—The author is work unit conservationist, Soil Conservation Service, Plattsburgh, N. Y.

Farmers can sell the thinned trees for pulpwood if they're of salable size. In 1955, they peeled the trees after they were chemically treated. But they found the white pines hard to peel. Last year they sap-peeled the white pine trees to be thinned and did not treat these trees with the chemical. Thy had no trouble in peeling red pines after the chemical treatment.

Regardless of the pulpwood income, the farmers who have used the district's service feel they have made a good investment. The remaining trees are free to grow into valuable timber. Saw logs now bring about $40 a thousand board feet at the roadside. Properly grown, logs harvested from thinned areas can produce a much larger board-foot volume per acre in a mature harvest.

Girdling and painting white pine trees in the Clinton County Soil Conservation District, N. Y.

"I sure like this service," said Chester Thew, one of the cooperators who has been thinning his woodland. "It costs little for so worthwhile a job. It's something that we had needed badly, for like most farmers, I have never had the time myself to give my woodland the attention I know it needs. This way, the district is taking care of it for me."

A BANKER'S VIEWPOINT

Why Bankers Are Interested in Providing Conservation Credit to Individual Farmers and Ranchers and to Responsible Groups Sponsoring Soil and Water Conservation Projects.

By ENOCH T. NIX

OF all the tangible property involved in financing operations in the average American community, none is more important than agricultural land. Farming is the Nation's biggest business, and productive land is the farmer's principal basic asset.

It is just as essential that we keep up our soil reserves as it is that banks or other businesses provide financial reserves against future needs and emergencies. This principle, moreover, holds equally true for an individual farm or ranch, an agricultural community, or the State or the Nation as a whole.

In talking about the overall situation, we sometimes are prone to overlook the importance of each individual farm or piece of land right around us. But, that is what we are concerned with, because it is the productive health of our agricultural lands at home that is so important to our own community.

We come up against this fact almost every day at the bank. We know how true it is that "Poor land makes poor people." Poor people on poor land aren't good credit risks for a bank; and they aren't the best customers for our merchants. Nor can they be expected to produce adequate tax revenues for our schools and highways, State services, National defense, and other public needs.

All of these are things in which a banker is interested. He has to be in order to keep in business, quite aside from his desire to provide public service. That is why we are interested in keeping agriculture financially sound. It is why our State and national bankers associations have active agricultural committees staffed by well-informed members. That is why so many individual banks have agricultural specialists or someone else in the organization who is particularly qualified to deal with this end of our relations and services.

It has been only natural, then, that we bankers should be alert to the possibilities of conservation farming and take positive steps to help further conservation programs. The spread of soil and water conservation has been one of the most remarkable agricultural developments in our time. We, as bankers, realize we can't afford to fall behind in the procession of local, State, and National interests that are working to speed the application of conservation farming on the agricultural lands.

Farmers, through their soil conservation districts, are able to get educational and technical assistance from the Soil Conservation Service and others. They also draw upon the facilities that are available from other Government or private sources. These may include anything from obtaining help from the State fish and game department in stocking farm ponds with fish, to borrowing or renting a grader or other special equipment from the parish (county) commissioners.

The plain fact is, though, that in addition to education and technical assistance, many farmers also need initial financial assistance in order to go ahead with their farm conservation programs as fast as they need to and want to.

To do the conservation job right, a man usually has to make considerable capital investment in seed, fertilizer, labor, rental of special machinery, and other items. Then, a farmer may have to wait a few years before his new system yields higher returns than his old one gave him, and find himself financially pinched in the meantime.

Actually, the only places this supplementary financial aid can come from, is either from private or public credit sources, or from direct Government cost sharing. Conservation cost sharing, notably through the Agricultural Conservation Program, and now through the newly expanding small watershed work, cannot nearly meet the total needs for conservation financing. Moreover, the Government is placing

Note:—The author is vice president, Bossier Bank and Trust Company, Bossier, La. He is also chairman of the agricultural committee of the Louisiana Bankers Association.

Enoch T. Nix.

increasing weight on the factor of public benefit in agreeing to share the cost of watershed protection and similar undertakings. Credit, heretofore available from Government agencies or lending institutions, for conservation improvements similarly has been limited.

Private bankers in increasing numbers throughout the country have developed an understanding and sympathetic attitude on the conservation credit needs of their customers. Many have taken the initiative in developing vigorous programs to promote soil and water conservation in their areas. It has simply been a case of realizing the opportunity for private banks to step into the conservation credit field, with profit to themselves, while at the same time doing a real service for their customers and the public. And, I assure you that our conservation-minded bankers want our farm customers to make fullest use of our services and facilities in conservation credit.

In this connection, I should like to call attention to the action of the 83rd Congress in amending the Water Facilities Act to make insured private bank credit available for financing soil- and water-conservation measures in all States. One practical advantage is that the borrower, the banker, and the Government work together in this conservation credit financing. Thus, when a banker has a customer who needs such a conservation loan he may send him to the local Farmers Home Administration office, indicating that the bank is willing to lend the money. The FHA office, in turn, passes on the application and processes it, advises the bank the loan is a desirable one, and finally gives the bank a guarantee for the full amount of the loan.

But, I should like to emphasize that we in the private banking field are not going to look upon insured Government credit arrangements as a substitute for our own conservation financing opportunities and obligations. The annual appropriation available for insured loans certainly is not enough to meet the needs of the farmers and ranchers who would find it good business to borrow money to go ahead with their conservation work. It is obvious, therefore, that the private commercial banker will continue to be a main source of conservation credit.

The new emphasis on small watershed protection and flood prevention appears to me to hold special promise from the community standpoint. There are few communities, indeed, that have not suffered costly damage from recurring floods on even small creeks and rivers. Many others have suffered from silting up of their municipal, power, or irrigation water reservoirs, or from having their water supplies curtailed through ground water depletion. And, too many communities have felt the general effects of declining agriculture because of poor land use and water waste in their watersheds.

Personally, I believe this approach to some of our land conservation and flood prevention problems is going to be increasingly effective as time goes on, because such watershed undertakings are basically local —not Federal — projects. They may be initiated and sponsored by local people in the community, who must stand their full share of the cost of such programs. I think we in the banking field will have the opportunity of doing a major service in soil and water conservation by making our financing facilities available both to individual farmers in project watersheds and to watershed associa-

tions or other interests sponsoring this work.

A good, sound conservation plan is fast becoming a necessity for today's progressive farmer or rancher—as a blueprint to efficient and stable operations, as a guide to what the return will be on his investment, and as a dependable credit support. By the same token, a "conservation bank plan" is fast becoming a necessity for every banking institution which operates in the field of agricultural credit. Thus are our efforts joined in the community of interests in which every group shares the responsibility of helping to build a more secure and satisfying future.

THE AMERICAN OASIS. By Edward Higbee. 259 pp. Illustrated. 1957. New York, Alfred A. Knopf, Inc. $5.00.

This book is an excellent discussion of our "land of plenty", how it got that way, and how we may keep it that way. A very interesting and readable book, mainly because it gives so many intimate details about American agriculture. These details may be obtained only by reading a book like this, or by personally making a long and arduous tour as the author did to collect his material.

This book deals with most types of agricultural problems in the United States and especially with soil- and water-conservation problems. It contains considerable historical material from Indian times to the present, but it is mainly about current and future problems. Present day surpluses and probable future shortages are discussed. The phenomenal progress and increased efficiency of American farmers during the last few decades is a main theme throughout the book. Yet, the author reserves his main arguments to point up the needs for soil and water conservation, and to tell some of the ways modern American farmers and progressive communities are going about this task. He dedicates the book to field technicians of the Soil Conservation Service and farmers of America's soil conservation districts.

Obviously, the author has traveled extensively and done much research in gathering his material. After three introductory chapters in which he presents the basic problems, he discusses many of the specific problems by regions. Several case histories of typical farmers or communities, that are using up-to-date scientific methods in production and conservation, are given for each of the major agricultural regions of the United States.

For those who wish to get a comprehensive review of current agricultural problems in most of the important regions of the United States, this book is highly recommended. The book also deserves wide reading by conservationists who wish to have this land remain: "The American Oasis."

—TOM DALE

FLAT TOP RANCH, The Story of a Grassland Venture. Edited by B. W. Allred and J. C. Dykes. 232 pp. Illustrated. 1957. Norman: University of Oklahoma Press. $4.00.

It works! Range conservation, when put to the test of practice, produces results. The story of Flat Top Ranch is the case history of one convincing example.

In 1938, Charles Pettit bought a little rundown ranch of 7,000 acres in central Texas. Adjoining the ranch was a community of equally rundown farms. Over the years Pettit added one of these farms after another to his original holding until now his boundary fence encloses 17,000 acres.

From the beginning, his ranch was "dedicated to the improvement of Herefords." He knew that cattle depend on grass, and that grass depends on soil and water. So he devoted his efforts to rebuilding soil, conserving water, and restoring grass along with the breeding and feeding of livestock.

His concern with conservation soon led him to the State college and experiment stations, the county agent, and the Soil Conservation Service. He became a cooperator with the Bosque Soil Conservation District.

He and his ranch manager planned for "permanence and profit." They rebuilt fences and roads, installed water facilities, built dams,

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and killed brush. Most of all, they nursed their grass from a predominantly poor condition to fair to good—some to excellent condition—in the face of the worst drought of recent times.

Louis Bromfield saw the ranch, recognized its conservation significance, and suggested a book to tell its story. He contributed two chapters. Conservationists and others who had consulted with Pettit and watched the ranch's progress returned to appraise the results.

Many of these conservationists contributed chapters: B. W. Allred on grass improvement; J. C. Dykes on water; W. R. Van Dersal on wildlife; Frank Reeves, livestock editor of the Ft. Worth *Star-Telegram*, reported on ranch improvements; ranch manager W. B. Roberts and superintendent G. O. Hedrick wrote of their livestock and farming operations, and several chapters by Martime Emert of Texas Christian University rounded out the story.

Allred and Dykes completed the editing of the book after Bromfield's death.

Despite some unevenness in presentation, the several chapters by people intimately acquainted with different aspects of the ranch give a thorough account of the Flat Top story. But Charles Pettit's 14-page Preface carries the real punchlines; here he gives the philosophy that is back of his grassland venture.

—BEN OSBORN

SPORTSMEN'S CLUB.—The Clinton County Farmers' and Sportsmen's Club of Ohio purchased an 87 acre farm in 1956 to establish a wildlife refuge. The farm manager immediately asked the local soil conservation district and SCS technicians to help in developing a farm-wide conservation plan. During the first year of operation the club has built a large farm pond, laid out 35 acres of contour stripcropping, constructed 600 feet of diversion terraces, planted 20,000 multiflora rose, and set out 2 acres of trees. Still other conservation projects, including 2 more ponds, are underway.

COOL SWIMMING.—Mr. and Mrs. Peter Ladzinski are enthusiastic conservation farmers. They have been since they became cooperators with their Franklin Soil Conservation District in 1954.

In 1956, they reviewed their conservation work to see how they stood. They figured they needed one thing more to complete the overall conservation program on their Hemlock Hill Farm near Northfield, Mass. It was a farm pond for fire protection and recreation.

A soil Conservation Service engineer staked out a site close to the farmhouse and designed a pond 6-feet deep. Then the Ladzinskis really got enthusiastic. In fact, they got impatient. They wanted to get the pond done. For one thing, Mrs. Ladzinski wanted to swim in it before cold weather set in. And cold weather in northwest Massachusetts sets in early.

A delay in getting pipe held up the work. Then there was another delay in lining up equipment.

As delays piled up, Mrs. Ladzinski's enthusiasm drooped as here determination rose. "I'm going to swim in that pond this year if I have to break the ice to do it," she vowed in the presence of witnesses.

The pond was finally finished in October. It took weeks to get 4 feet of water in the pond. But on a chill November 2, Mrs. Ladzinski kept her vow. She had her swim.

—EDWARD G. KONIECZNY

CONSERVATION FELLOWSHIPS.—The National Wildlife Federation will award a number of fellowships to qualified individuals working in the field of conservation or conservation education for the school year 1958-59. A maximum of $1,000 may be granted to graduate and post-graduate students. Undergraduate fellowships are limited to a maximum of $500. According to the Federation's Washington, D.C. office, all applications for such fellowships must be submitted before December 31, 1957.

ONE PROGRAM.—Soil and water conservation can't be separated. The watershed approach, on which we are experiencing renewed emphasis, has been part and parcel of our soil conservation concept since experimental and research work started nearly 30 years ago.

—D. A. WILLIAMS, *Administrator*
Soil Conservation Service